

## ABSTRACT

A feed forward power amplifier is disclosed which utilizes three signal cancellation loops. Loop 1 includes a main amplifier and is used to derive a carrier cancelled sample of the main amplifier output. Loop 2 includes an error amplifier used to amplify the carrier cancelled signal derived from Loop 1 operation in order to cancel distortion products generated due to the nonlinear nature of the main amplifier. Loop 2 also utilizes a very short Loop 2 delay line. A significant efficiency gain is provided due to reduced output power losses associated with the Loop 2 delay line. Lower output losses also results in lower distortion levels produced by the main amplifier. This, in turn, reduces the size and performance requirements placed on the error amplifier. A smaller and more efficient error amplifier is employed resulting in further amplifier system efficiency improvement. A spurious signal detector for out-of-band distortion detection and an associated microcontroller for Loop 1 and Loop 2 control are also provided. A third signal cancellation loop is utilized to sample the amplifier output and reduce the carrier level of the signals sampled at the output of the amplifier before providing the sampled output to the spurious signal detector. By significantly reducing the carrier power level relative to distortion power levels a cost effective spurious signal detector can be utilized. This also provides a faster conversion time in Loop 2 cancellation and enhanced cancellation of out-of-band distortion products due to a greater useful dynamic range available for the DSP employed in the spurious signal detector.